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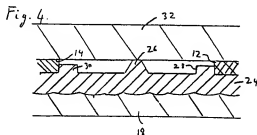
(71) Applicant: Britax Vega Limited  
 Berry Hill Industrial Estate George Baylis Road  
 Droitwich Worcestershire WR5 9AZ(GB)

(72) Inventor: McBride, Joseph Ivor  
 15 St. Kenelms Road  
 Romsley West Midlands B62 0NU(GB)

(74) Representative: Hollinghurst, Antony  
 BRITAX CENTRAL RESEARCH & DEVELOPMENT  
 Kingsbury Road Curdworth  
 Sutton Coldfield West Midlands B76 9EQ(GB)

(54) Method of moulding articles from at least two distinct thermoplastic materials.

(57) When moulding a multi-coloured article on a multistation injection moulding machine, the mould is shaped so that the element (24) moulded at the first station includes a separation rib (26) adapted to engage with the surface of one mould half (32) at the second station to form separate mould cavities for the second and third materials (12 and 14). A respective check rib (28, 30) is formed on each side of the separation rib (26), each check rib projecting so as to leave a clearance between such rib and the surface of said mould half (32). The check ribs (28, 30) ensure that the second and third plastics materials reach the separation rib (26) as a uniform front and at a reduced pressure, with reduced material dwell against the separation rib (26) at high temperature. A similar check rib is provided adjacent to the boundary of any zone in which the element (24) moulded at the first station extends through the entire thickness of the article.



- 1 -

Method of Moulding Articles from at least  
two distinct Thermoplastic Materials

This invention relates to a method of moulding articles of which the various parts are formed from at least two thermoplastic materials differing from one another by at least one property, such as colour.

5       One known method of moulding such articles is to use a multistation injection moulding machine in which a first set of identical mould halves is mounted on a turntable and a second set of mould halves is mounted with such mould halves disposed at respective stations confronting the first set. Each mould half  
10      of the second set is shaped to co-operate with a mould half of the first set to form a mould for a respective stage of the moulding operation. Between the performance of each such stage, the turntable rotates so that each mould half of the first set is offered in turn to each mould half of the second set, the  
15      articles remaining in the mould halves of the first set between successive stages.

It is already known to mould a first part of an article, which is to be formed from a first material, at the first station on a moulding machine of the foregoing type and to mould other  
20      parts, to be formed from at least two other materials, at a second station at which the already moulded first part serves to separate the two other materials from one another. It has been proposed, e.g. in U.K. Specification No. 2004494, that, where zones of the second and third materials are required to

abut one another, separation between such zones can be achieved by moulding a tongue of the first material so that it extends across the junction between such two zones, the tongue carrying a rib which projects between the two zones. At the second station, the rib engages with the mould half of the second set to form a barrier between the two zones. If the second and third material in these zones is to be covered by a layer of the first material, the tongue preferably forms part of such layer. Otherwise, the tongue may merely overlie the boundary region between the two zones.

When using the foregoing method, it has been found that if, during injection at the second station, the advancing pressured front of one of the second or third materials reaches the rib before the other, such material tends to leak over the top of the rib. In addition, air can be trapped between the various advancing fronts. The present invention aims to overcome these problems but is also of more general application.

According to the invention, in a method of moulding an article of which the various parts are formed from at least two thermoplastics materials differing from one another by at least one property, wherein a first molten thermoplastic material is injected into a first mould assembly comprising first and second mould halves for forming a first element of the article, and a second molten thermoplastic material is injected into a second mould assembly, of which only the second mould half is different from that of the first mould assembly, for forming a second element of the article, the first element including a web in abutment with the first mould half and carrying a projection adapted to engage with the surface of the second mould half of the second mould assembly to bound a mould cavity for the second material with the web underlying at least part of said cavity, the web further carrying a check rib extending parallel to and spaced from the projection and being dimensioned so as to leave a clearance between such rib and the surface of the second mould half of the second mould assembly.

The web carrying the projection may be part of a skin forming one surface of the article with respective zones of materials differing from one another forming the opposite surface of the article.

When the invention is applied to multistation moulding machines of the type mentioned above, two first mould halves are mounted on the moulding machine turntable and two second mould halves are mounted at two angularly offset stations confronting the first mould halves. The turntable is rotated between each moulding operation to bring each first mould half successively into alignment with the second mould half of the first assembly and the second mould half of the second assembly.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of part of a rear light cluster for a motor vehicle,

Figure 2 is a plan view showing the disposition of the mould halves on a turntable of a two-station moulding machine,

Figure 3 is a cross-section on the line AA in Figure 1 after completion of the moulding operation at the first station,

Figure 4 is a cross-sectional view of the line AA during the moulding operation at the second station and,

Figure 5 is a cross-sectional view of the line AA of the completed article.

Referring to Figure 1, a lens for a motor vehicle rear lamp, has a clear zone 10 for a reversing light, an amber zone 12 for a direction indicator and a red zone 14 for the remaining lights and the reflector. The lens is moulded with a skin of clear plastics material which extends over the whole lens. There is clear plastics material for the full thickness of the lens in zone 10 and clear material overlaid with amber and red material in zones 12 and 14 respectively.

Figure 2 shows the turntable 16 of a two-station injection moulding machine having two identical mould halves 18 and 20 mounted thereon at intervals of  $180^{\circ}$ . When the mould half 18 is in the position shown in Figure 2, it co-operates with a mould half 22 (Figure 3) above the turntable 16 to define a cavity for moulding a part of the article which is to be in clear plastic, namely the zone 10 for the reversing light (Figure 1) and a skin 24 extending over the entire area of the lens. As shown in Figure 3, a separation rib 26 is formed on the skin 24

to define the boundary between the zones 12 and 14. Check ribs 28 and 30, of half the height of the separation rib 26, are formed on each side thereof.

5 After completion of the first stage of the moulding, the turntable 16 is rotated through  $180^{\circ}$  to bring the mould half 18 into the station previously occupied by the mould half 20 and vice versa. The mould half 18 now co-operates with a mould half 32 (Figure 4) while the mould half 20 co-operates with the mould half 22. Next, red plastics material is injected  
10 into the zone 12 through a feed point 34 and amber plastics material is injected into zone 14 through a feed point 36 as shown in Figure 1. The flows of injected plastics material from the two feed points 34 and 36 are deflected when they reach the respective check ribs 28 and 30, as shown by chain-dotted  
15 lines 38 and 40 respectively, so that the parts of the zones 12 and 14 on the opposite side of the check ribs 28 and 30 from the separation rib 26, are filled with plastics material before any significant quantity flows over the check ribs 28 and 30, as shown in Figure 4. In the final moments of injection,  
20 plastics material flows over these check ribs 28 and 30 so as to completely fill the zones 12 and 14, as shown in Figure 5. At the same time, the skin 24 and zone 10 of a second lens is formed in the mould halves 20 and 22.

Thus the invention has the result of ensuring that  
25 the red and amber plastics material reach the separation rib 26 as a uniform front and at a reduced pressure, with reduced material dwell against the rib 26 at high temperature. Any leakage of one colour into the zone of the other is limited to the strip bounded by the check ribs 28 and 30. The invention  
30 has the further advantage that an air path adjacent to each side of the separation rib 26 remains clear until the injection is almost complete, thereby minimising the risk of air being trapped in the moulding.

Preferably, the check ribs 28 and 30 extend beyond  
35 the separation rib 26 along the edges of the clear zone 10. This reduces the possibility of coloured flash extending into the zone 10.

If desired, more than one check rib may be provided on each side of the separation rib 26 and/or along the edges of the clear zone 10. This has the effect of reducing the pressure of the advancing material in stages.

CLAIMS

1. A method of moulding an article of which the various parts are formed from at least two thermoplastics materials differing from one another by at least one property, wherein a first molten thermoplastic material is injected into a first mould assembly comprising a first mould half (18, 20) and a second mould half (22) for forming a first element (10, 24) of the article, and a second molten thermoplastic material is injected into a second mould assembly, of which only the second mould half (32) is different from that of the first mould assembly, for forming a second element (12, 14) of the article, the first element including a web (24) in abutment with the first mould half (18, 20) and carrying a projection (26) adapted to engage with the surface of the second mould half (32) of the second mould assembly to bound a mould cavity for the second material with the web (24) underlying at least part of said cavity, characterised by a check rib (28, 30) carried by the web (24) and extending parallel to and spaced from the projection (26), the check rib (28, 30) being dimensioned so as to leave a clearance between such rib (28, 30) and the surface of the second mould half (32) of the second mould assembly.
2. A method according to claim 1, characterised in that the web (24) carrying the projection (26) is part of a skin forming one surface of the article with respective zones (10, 12, 14) of materials differing from one another forming the opposite surface of the article.
3. A method according to claim 1 or 2, characterised in that the projection (26) comprises the edge of a zone (10) in which the first element occupies the complete thickness of the space between the first and second mould halves (18, 20 and 32) of the second mould assembly.
4. A method according to claim 1 or 2, characterised in that the projection (26) comprises a separation rib extending between a zone (12) in which the surface defined by the second mould half of the second mould assembly is formed by the second material and a zone (14) in which said surface is formed by a third thermoplastic material differing from the first and second materials.
5. A method according to claim 4, characterised in that a second check rib (30) is provided on the opposite side of the separation rib from the first check rib (28).

6. A method according to any preceding claim, characterised in that a second check rib is provided between the projection (26) and the first check rib (28, 30).

7. A method according to any preceding claim, characterised in that the first mould half (18, 20) of the first mould assembly also serves as the first mould half of the second mould assembly, the first element (10, 14) remaining in the first mould half (18, 20) until completion of the moulding operation in the second mould assembly.

8. A method according to claim 7, wherein two first mould halves (18 and 20) are mounted on a moulding machine turntable (16) and two second mould halves (22, 32) are mounted at two angularly offset stations confronting the first mould halves (18, 20), the turntable (16) being located between each moulding operation to bring each first mould half (18, 20) successively into alignment with the second mould half (22) of the first assembly and the second mould half (32) of the second assembly.



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Fig. 1.

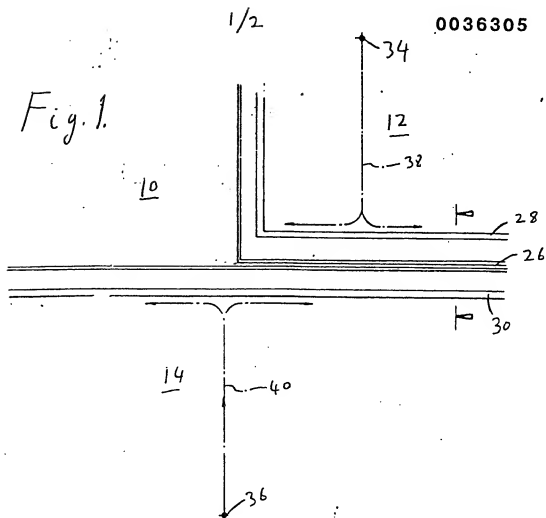


Fig. 2.

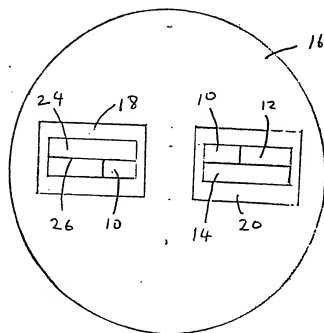


Fig. 3.

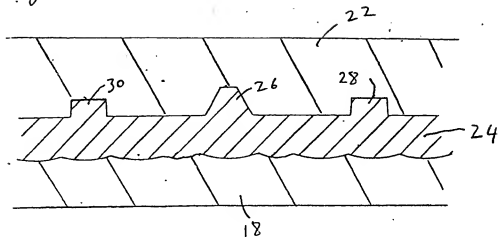


Fig. 4.

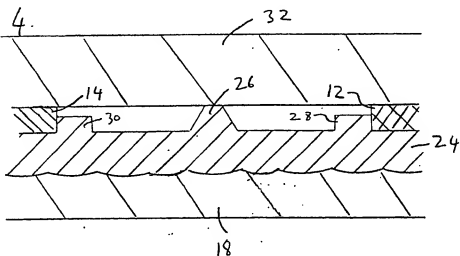
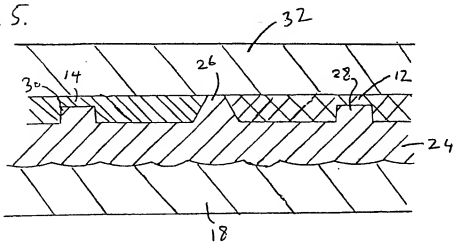


Fig. 5.





European Patent  
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# EUROPEAN SEARCH REPORT

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Application number

EP 81 30 1052

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	FR - A - 2 403 180 (SOC. DE SIGNALISATION AUTOMOBILES SEIMA)  * the whole document *	1,2,4,7,8	B 29 F 1/12
D	& GB - A - 2 004 494  ---		
A	FR - A - 2 172 127 (SWF-SPEZIALFABRIK FÜR AUTOZUBEHÖR GUSTAV RAU)  * page 5, lignes 18-21; figures 1,2 *	1	
A	NL - A - 67 01 653 (PHILIPS' GLOEI-LAMPENFABRIEKEN)  * the whole document *  -----	1	TECHNICAL FIELDS SEARCHED (Int. Cl.)  B 29 F
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
<input checked="" type="checkbox"/> The present search report has been drawn up for all claims			<input type="checkbox"/> member of the same patent family corresponding document
Place of search The Hague		Date of completion of the search 17-06-1981	Examiner BOLLEN